

AMENDMENTS TO THE CLAIMS

The listing of claims below replaces all prior versions of claims in the application.

Claim 1 (Currently Amended): An integrated circuit comprising:

a fine vacuum tube element and other electronic elements integrated and formed on a substrate of a semiconductor,

a magnetic field generating unit integrated and formed on the substrate of said semiconductor in communication with said fine vacuum tube element, and

the fine vacuum tube element and the other electronic elements transmit signals to and from each other;

wherein an interference system is constructed from said fine vacuum tube element.

Claim 2 (Original): The integrated circuit as claimed in claim 1, wherein when integrating the vacuum tube element with the other electronic elements, a quantum effect is realized in a room temperature environment by utilizing ballistic electrons (non-scattering electrons) traveling through the vacuum.

Claim 3 (Canceled)

Claim 4 (Previously Presented): The integrated circuit as claimed in claim 1 or 2, wherein an interference system is constructed and weighting of the interference system is constituted for image processing and signal code conversion to realize an advanced function-integrated type.

Claim 5 (Original): The integrated circuit as claimed in claim 1 or 2, wherein a very high-speed light-receiving integrated circuit for optical communication is constructed by utilizing a very high-speed optical response characteristic of electron emission of the vacuum element.

Claim 6 (Original): The integrated circuit as claimed in claim 1 or 2, wherein a sensor such as a magnetic/electric field sensor is constructed by utilizing a quantum effect of ballistically traveling electrons.

Claim 7 (Previously Presented): The integrated circuit as claimed in claim 1 or 2, wherein a thermionic cathode is used as a cathode of the vacuum element.

Claim 8 (Original): The integrated circuit as claimed in claim 7, wherein LaB6 (lanthanum hexaboride) or carbon nanotube is attached to the thermionic cathode.

Claim 9 (Previously Presented): The integrated circuit according to claim 1, wherein the interference system is a Mach-Zehnder interferometer.

Claim 10 (Previously Presented): The integrated circuit according to claim 4, wherein the interference system is a Mach-Zehnder interferometer.

Claim 11 (Previously Presented): The integrated circuit device according to claim 1, wherein the other electronic elements are solid state devices.

Claim 12 (Previously Presented): The integrated circuit device according to claim 1, wherein the magnetic field generating unit is a coil.

Claim 13 (Previously Presented): The integrated circuit device according to claim 1, wherein the magnetic field generating unit is two current lines.

Claim 14 (Previously Presented): An integrated circuit comprising: a fine vacuum tube element and other electronic elements integrated and formed on a substrate of a semiconductor, a quartz window in communication with said fine vacuum tube element, a photoelectric conversion element in communication with said quartz window, wherein said quartz window is configured to direct light to said photoelectric conversion element, and

the fine vacuum tube element and the other electronic elements transmit signals to and from each other;

wherein an interference system is constructed from said fine vacuum tube element.

Claim 15 (Previously Presented): An integrated circuit comprising:

a fine vacuum tube element and other electronic elements integrated and formed on a substrate of a semiconductor,

a slit unit having a double slit, such that ballistic electrons pass through the double slit;

wherein said slit unit is contained within the fine vacuum tube element,

a magnetic field generating unit in communication with said fine vacuum tube element,

and

the fine vacuum tube element and the other electronic elements transmit signals to and from each other;

wherein an interference system is constructed from said fine vacuum tube element; and

wherein signals are transferred between the fine vacuum tube element and the electronic elements.

Claim 16 (New): An integrated circuit comprising:

a fine vacuum tube element and transistors integrated and formed on a substrate of a semiconductor,

a magnetic field generating unit integrated and formed on the semiconductor substrate,

and

the fine vacuum tube element and the other electronic elements transmit signals to and from each other;

wherein an interference system is constructed from said fine vacuum tube element.

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Claim 17 (New): The integrated circuit of claim 1, wherein the fine vacuum tube element and transistors are connected by wires.